



# Pre-Feasibility Study Drainage and Sewerage System Improvement Project for Do Son and Duong Kinh Districts, Haiphong City

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Executive Summary

Report prepared by GFA Consulting Group



## **A. Development Objective of CDIA**

1. The objective of the Cities Development Initiative for Asia (CDIA) is to support prioritized urban infrastructure investments.
2. The elaboration of a Pre-Feasibility Study (PFS) for wastewater and stormwater management (treatment and network facilities) and investments as well as the development of innovative financing options for identified wastewater and drainage projects are the general objectives that form the base of the assignment carried out by GFA Consulting Group GmbH contracted by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

## **B. Brief Information of Project Objectives and Background (Specific Objectives)**

3. The People's Committee of Haiphong City approved with Decision 2145/QD-UBND, dated 07 December 2012, the preparation of a Pre-Feasibility Study for "Drainage and Sewerage System Improvement Project for Do Son and Duong Kinh Districts, Haiphong City".
4. CDIA received a complete PFS application from the Haiphong People's Committee (PPC) in February 2012 with a request to provide technical assistance in preparing a PFS for wastewater and storm water infrastructure projects and needs for capacity building for the two new urban districts of Do Son and Duong Kinh in Haiphong City, Vietnam. CDIA, supported by GIZ, duly approved the request and concluded that good conditions exist to provide technical assistance to the city administration. The objectives of this PFS are:
  - 4.1. Elaboration for prioritized urban infrastructure investments in the area of domestic/industrial wastewater treatment facilities as well as wastewater and storm water network facilities (incl. pumping stations) in the two districts of Do Son and Duong Kinh, including a climate change adaptation (flood prevention) component in Do Son;
  - 4.2. Support to develop/present Priority Projects regarding industrial/domestic wastewater treatment and drainage systems to the market and identify innovative financing options through the commercial, private sectors and/or international lending institutions.
5. An urgent need exists for improving the wastewater and storm water infrastructures for the Do Son and Duong King districts, which are suffering from regular floods due to a combination of frequent heavy rainfall and high tides. In addition, the aquatic ecosystems in the two districts are seriously degraded since untreated wastewater is discharged to the receiving water bodies. The very few drainage and wastewater facilities are in poor condition and urgently need rehabilitation, upgrading and extension. Public health and the environment are seriously at risk. Due to the complexity of the problems, any intervention in the sanitation sector must aim at sustainably addressing the described problems by defining comprehensive, but also realistic objectives.
6. These studies are a continuation of the City's effort to improve its sanitation situation. The on-hand PFS elaborates on the measures which will ultimately improve the habitat and the environmental conditions in the project areas. By following the Terms of Reference (ToR) for this assignment and the CDIA Guidelines, the outputs of this PFS provide the technical, financial, environmental, and social assessments of identified Priority Projects at a level of detail which is sufficient to progress in a subsequent Feasibility Study (FS).

## **Main conclusions and recommendations**

7. In this PFS two priority projects have been identified to improve the urban environmental conditions in Do Son and Duong Kinh Districts. Both Districts are included

entirely (not only the urban centres) into the projects. The following improvements are proposed as priority projects:

- I. Construction of wastewater and drainage infrastructures in order to mitigate the significant gaps in health and living conditions for the growing population residing in the project areas, being presently close to 100,000 people. Total investment costs for the both districts being nearly 75 Million USD;
- II. Improving the capacity and capabilities of the institutions responsible for development and operation of the infrastructure and climate change initiatives.

8. The two districts are highly favorable areas for prioritized drainage, sewerage and wastewater development. The proposed concept will provide for measures to ensure that the urban poor will have access to the infrastructure network.

9. The recommended infrastructure projects can be seen as future opportunities of formulating and implementing a pilot project of a modern wastewater management in Vietnam.

10. It is assumed that a greater in-depth analysis, e.g. on viability of the identified Priority Projects, will be undertaken in a subsequent FS.

### **C. Summary of Analysis**

11. GIZ hired GFA Consulting Group's Project Team to provide technical assistance for preparing the PFS for Haiphong. The Project Task Force (TF) / Steering Committee (SC) was established readily during the Inception Phase to cooperate closely with the Consultant's team.

12. This Final Report presents details of (i) the PFS for the Do Son and Duong Kinh urban drainage and wastewater sectors in its entirety, (ii) the Consultant's work with a wide range of city stakeholders to formulate an innovative sector strategy, and (iii) describes options for the identified Priority Projects and/or scenarios for project implementation of drainage and wastewater sector investments, including measures for immediate implementation, as well as for capacity development.

13. An Inception Report, including the evidence based situation as well as a gap analysis, was prepared and submitted in February 2013. The Inception Report summarized preliminary findings from initial data gathering, research and meetings held with the Project TF, district administration and related companies and agencies. The Inception Report also included an assessment of a variety of existing reports and the Haiphong Master Plan 2025. An updated version of the Inception Report included the comments provided by the TF and CDIA.

14. An Interim Report was prepared and submitted in March 2013, which was primarily focusing on various data gathering exercises, the gap analysis and developments across the key investment sectors, giving some indication on the Priority Projects to be identified during the remaining PFS implementation phase, as well as on the final identification and conceptual design of prioritized projects.

15. It is strongly recommended by the Consultant that both previous reports are also considered in order to ensure that this investment report (main PFS report) is easily understood. The onhand report constitutes the final output of this PFS, in which urban infrastructure investments are proposed for the two districts of Do Son and Duong Kinh, and describes which management development is suggested. The scope of analyses and

identified infrastructure project includes (i) domestic wastewater collection and treatment facilities as well as (ii) storm water drainage systems. The described management development includes capacity building in regard to (i) operation and maintenance (O&M), (ii) administrative measures and (iii) cooperation between the different stakeholders that are involved in monitoring and development of the wastewater sector and drainage.

### **Brief Description of Current Situation**

16. Haiphong is the third biggest city in Vietnam, with a total population of 1,907,705 of which 879,450 people live in urban areas (2012). The city is the major port in northern Vietnam and a rapidly developing centre for industrial production. Haiphong City consists of seven districts. The two coastal districts Do Son and Duong Kinh are newly classified urban districts with populations of 47,308 and 50,669 (2012) respectively.

17. The proposed interventions are a reflection of the main urban environmental gaps for a projected population of 120,000 residents and a 30% increase of wastewater flow due to tourism in the high season in Do Son. The main problems are pollution by wastewater and insufficient drainage in the urban areas, caused by erratic discharge from sewers to the environment, and pollution of the streets when sewers are overflowing together with storm water in common systems (mixed systems).

18. Duong Kinh's structure may be described as peri-urban and in some parts still rural. The area is rapidly developing, mainly along the main road leading from Haiphong's inner city to Do Son District and around the existing villages. It is a mixture of industrial sites, residential areas as well as urban agriculture.

19. Do Son is a major tourist centre catering mainly for national tourists. The southern and southwestern coastline areas are allocated for further development, i.e. for resorts, hotels and hospitals. The north-western part of Do Son District is still quite rural, characterized by some small villages and urban agriculture. Haiphong's industrial zones are located in both districts along the main highway. The currently existing 25 companies possess of around 3,500 employees and produce mainly consumer goods.

20. Both coastal districts fail to meet the physical infrastructure needs of rapidly growing neighbourhoods. The domestic wastewater is directly discharged into the ground and water bodies and/or discharged into rivers and canals and flows finally untreated into the sea. The very basic urban drainage system consisting of combined drainage and sewerage systems heavily pollutes the urban/rural environment and triggers health related problems for some households.

21. Do Son, as being seen as a major (seasonal) tourist destination in Haiphong, will benefit strongly from urgent improvements of its environment by minimizing pollution levels and by improving drainage.

22. In previous years, these areas have been overlooked while planning for development projects. Finally the city administration got aware that this issue needs to be addressed and developed respective concerns. Haiphong's strategic Master Plan does address the need to tackle growing urban poverty in the city; however no plan exists on how to address the needs of these communities and areas through future development projects.

### **Water Supply in Don Son and Duong Kinh**

23. Haiphong Water Supply Company (WSCO) is the Provincial Water Company managing water supply services in Haiphong Urban City and its surrounding areas, including the project area comprising Do Son and Duong Kinh districts. The large majority of these two districts is connected to the urban water supply system.

24. Haiphong WSCO is collecting a wastewater fee of 15% of the water tariff (excluding VAT), of which about 14% is provided to the wastewater operator. More detailed information about the water and sewerage tariff can be found in Chapter 5.7 of the Inception Report.

**Economic Structure**

25. The service sector has an overriding importance in Haiphong’s economic sector, contributing to 53% to the Gross Domestic Product (GDP). The industrial sector achieves 37%. The agricultural and fishery sector still accounts for 10% of Haiphong’s GDP due to the rural and coastal areas of the province. Within the project area, it can be assumed that the service sector will be even more dominant in Do Son in future; and that agriculture and fishery will get more important. In Duong Kinh, the industrial sector might be the most important sector followed by agriculture.

26. This can be reflected against the background of an average annual income per capita of USD 560 and USD 1,400 in Do Son and Duong Kinh districts respectively.

**Recommended Priority Projects and Strategies**

27. Two Priority Projects have been identified to improve the urban environmental conditions in Do Son and Duong Kinh.

28. The first Priority Project includes the construction of wastewater and drainage infrastructure in order to mitigate the significant gaps in health and living conditions for the growing population residing in the project areas, being presently close to 100,000 people.

**Table 1:** Overview of recommended investments and related costs

DISTRICT	Service Lines		Collection Sewers		Transport Mains		Pressure Lines		Total
	km	MUSD	km	MUSD	km	MUSD	km	MUSD	
DO SON	190	9.10	21.3	3.22	20.4	5.79	5.0	0.87	18.98
DUONG KINH	205	9.81	32.9	4.97	16.5	4.68	6.0	1.05	20.51
<b>TOTAL</b>	395	18.91	54.2	8.19	36.9	10.47	11.0	1.93	39.49

29. Table 1 above presents the estimated investment costs for recommended wastewater and drainage infrastructure for both districts of nearly 40 Million USD (MUSD) as well as the lengths of recommended sewer lines (service, collection, transport, and pressure lines). This includes also service lines and connection points for household connections.

30. The **second Priority Project** aims at improving the capacity and capabilities of the institutions responsible for the development and operation of respective infrastructure as well as for climate change initiatives. This project is considered essential in order to meet the significant management challenges related to the sustainable development of the recommended infrastructure measures as well as demands related to growth rates in the two areas.

31. The development of the two Priority Projects is in accordance with the Government of Vietnam (GoV)’s key strategies and plans regarding environmental development, disaster mitigation and climate change measures. These strategies and plans are reflected in a merged effort by the two key ministries in charge, namely (i) Ministry of Agriculture and Rural Development (MARD) being in charge for Disaster Risk Management (DRM), and (ii) Ministry of Natural Resources and Environment (MONRE) in regard to Response to Climate

Change (RCC) and environmental management, in order to achieve a sustainable development.

32. The developed strategy is that the combined Priority Projects should be practical, achievable, measurable, sustainable and affordable. The strategy therefore focuses on urgent measures to be achieved, instead of covering the full demands for development. However, this strategy is also intended to be a platform for long-term development in accordance with the actual realization of the elements of the new Master Plan. This will provide the flexibility to (i) maximize the expected value of infrastructure developments and (ii) to adapt to changes in plans decades later.

33. Even though the projects intrinsically are elements of sustainable social development, there are some pre-conditions for obtaining sustainability of the proposed infrastructures. It is not financially viable without a complete re-assessment of fees and funding of wastewater management; however, in terms of cost recovery of capital investments and O&M.

### **Capacity Building Measures**

34. The envisioned sustainable and practical development of sanitation and environmental management is depending heavily on (i) technical innovation, (ii) appropriate performance criteria and (iii) careful consideration to maintain and improve environmental protection. In this context, it is important (i) to support the development of cooperation between the many key players that have to comment or permit initiatives not yet common practice in Vietnam, and more importantly (ii) to develop feasible management of the sewer and drainage systems as well as (iii) integrated environmental management and monitoring procedures to secure sustainability.

35. Furthermore, the inclusion of the national Disaster Risk Management (DRM) and Response to Climate Change (RCC) enhances the complexity in practices but also brings opportunities for funding and innovation. This requires high knowledge and experience being developed through capacity building supported by experts with a combination of international and national leverage.

### **PPP Opportunity for Wastewater Management**

36. It is expected that this PFS provides (i) primary impressions and assessments on business environments, (ii) an overview how current wastewater sector policies, framework and regulations encourage Private Sector Partnerships (PPP), as well as (iii) a reflection of possible problems, bottlenecks and risks incorporated particularly with financing and tariffs for conducting urban wastewater infrastructure investment projects in a sustainable manner. It is difficult to establish adequate funding with the present wastewater and structure.

### **Tentative Cost Estimates**

37. The overall costs for the measures proposed in this PFS are provided in Table 2 below. For Duong Kinh only a centralized drainage and treatment solution is considered based on a thorough analysis of local conditions and opportunities. For Do Son District, a centralized as well as a de-centralized solution was analysed and is presented in the following of this PFS. The cost presented in the following include Capital Expenditure (CAPEX) as well as Operational Expenditure (OPEX) for the proposed infrastructures, broken down in CAPEX for the wastewater treatment plants (WWTP), network and administration, as well as OPEX for O&M.

**Table 2: CAPEX and OPEX for Sewerage Systems and WWTPs Priority Projects**

ITEM	Duong Kinh		Do Son			
			De-centralized		Centralized	
	USD	VND	USD	VND	USD	VND
		million		million		million
CONSTRUCTION WWTP	6,240,000	130,336	4,836,000	101,081	6,240,000	130,366
CONSTRUCTION NETWORK	23,330,000	487,715	20,404,000	426,076	21,661,000	452,714
ADMINISTRATIVE COST	4,840,000	101,072	4,110,000	85,825	4,580,000	95,822
<b>TOTAL</b>	<b>34,410,000</b>	<b>719,153</b>	<b>29,358,000</b>	<b>613,405</b>	<b>32,480,000</b>	<b>678,902</b>
O&M (ANNUAL)	386,497	8,078	290,366	8,331	398,611	6,069

Source: Consultant Administrative cost includes: land acquisition, contingency  
Construction cost includes: construction, consultancy fee, PMU

### Drainage systems

**Table 3: Drainage Upgrade in Duong Kinh and Do Son**

Unit/Drain	D200*	D300	D400	D500	D600	D800	D1000	D500	2000x2000
km	3.745	0.3418	6.544	2.745	7.597	5.527	31.28	10.5	19.823
+/-5%km	0.187	0.0171	0.327	0.137	0.380	0.276	1.564	0.525	0.9912
<b>Total km 4,405</b>									
Cost*	0.102	0.284	0.317	0.414	0.554	0.877	1.383	0.554	2.153
Mill USD	0.0191	0.00485	0.104	0.057	0.210	0.243	2.1628	0.291	2.134
<b>Total Mill USD: 5.23</b>									

\* Million USD / lkm

**Table 4: Priority extension of drainage system in Do Son City**

Unit/Drain	Total	1500x1500	2000x2000	2000x2400
km	3.5	2.4	15.0	100 m (in 6 pieces)
Unit Cost *		1.2	2.2	
Million USD	6.1	2.8	3.3	

\* Million USD / lkm

38. The total budget for drainage upgrades in Do Son and Duong Kinh areas and drainage priority extension in Do Son area is proposed to be 11.33 Million USD.

**Table 5: Grand total Priority Project Cost**

Item	DUONG KINH		DO SON			
			De-centralized		Centralized	
	USD	VND	USD	VND	USD	VND
		million		million		million
<b>1. Sewerage and WWTPs</b>						
<b>Total 1. S &amp; WWTP</b>	34,410,000	719,153	29,358,000	613,405	32,480,000	678,902
O&M (annual)	386,497	8,078	290,366	8,331	398,611	6,069
<b>2. Drainage Systems</b>						
Extension Do Son	-		6,100,000	127,484	6,100,000	127,484
Upgrade DS and DK	2,615,000	54,651	2,615,000	54,651	2,615,000	54,651
<b>Total 2. Drainage</b>	<b>2,615,000</b>	<b>54,651</b>	<b>8,715,000</b>	<b>182,135</b>	<b>8,715,000</b>	<b>182,135</b>
<b>Grand total 1+2</b>	<b>37,025,000</b>	<b>773,804</b>	<b>38,073,000</b>	<b>795,540</b>	<b>41,195,000</b>	<b>861,037</b>